

2.4

Vertical Angles

Goal Find the measures of angles formed by intersecting lines.

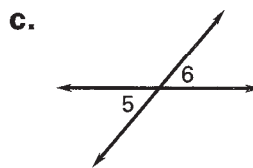
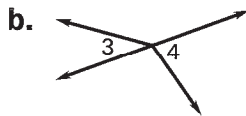
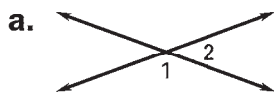
VOCABULARY

Vertical angles

Linear pair

Example 1 Vertical Angles and Linear Pairs

Determine whether the labeled angles are *vertical angles*, a *linear pair*, or *neither*.



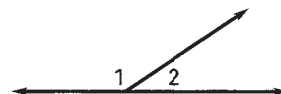
Solution

- a. $\angle 1$ and $\angle 2$ are _____ because they are adjacent and their noncommon sides are on the same line.
- b. $\angle 3$ and $\angle 4$ are _____.
- c. $\angle 5$ and $\angle 6$ are _____ because they are not adjacent and their sides are formed by two intersecting lines.

POSTULATE 7: LINEAR PAIR POSTULATE

Words If two angles form a linear pair, then they are supplementary.

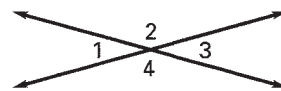
Symbols $m\angle 1 + m\angle 2 = \underline{\hspace{2cm}}$



THEOREM 2.3: VERTICAL ANGLES THEOREM

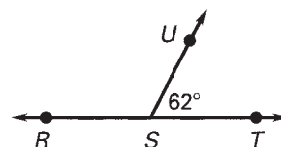
Words Vertical angles are .

Symbols $\angle 1 \cong \angle 3$ and $\angle \underline{\hspace{1cm}} \cong \angle \underline{\hspace{1cm}}$.



Example 2 Use the Linear Pair Postulate

Find the measure of $\angle RSU$.



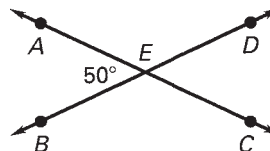
Solution

$\angle RSU$ and $\angle UST$ are . By the Linear Pair Postulate, they are .

$$m\angle RSU = 180^\circ - m\angle UST = \underline{\hspace{1cm}} - \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

Example 3 Use the Vertical Angles Theorem

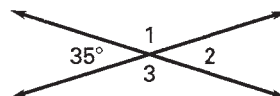
Find the measure of $\angle CED$.



Solution

$\angle AEB$ and $\angle CED$ are angles. By the Vertical Angles Theorem, \cong .

$$m\angle CED = m\angle AEB = \underline{\hspace{1cm}}$$

Example 4 Find Angle MeasuresFind $m\angle 1$, $m\angle 2$, and $m\angle 3$.**Solution**

$$m\angle 2 = \underline{\hspace{2cm}}$$

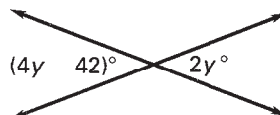
Use the Vertical Angles Theorem.

$$m\angle 1 = 180^\circ - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Use the Linear Pair Postulate.

$$m\angle 3 = m\angle \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Use the Vertical Angles Theorem.

Example 5 Use Algebra with Vertical AnglesFind the value of y .**Solution**

Because the two expressions are measures of vertical angles, you can write the following equation.

$$(4y - 42)^\circ = \underline{\hspace{2cm}}$$

Vertical Angles Theorem

$$4y - 42 - \underline{\hspace{2cm}} = 2y - \underline{\hspace{2cm}}$$

Subtract $\underline{\hspace{2cm}}$ from each side.

$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Simplify.

$$=$$

Divide each side by $\underline{\hspace{2cm}}$.

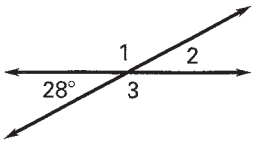
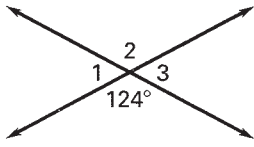
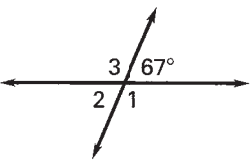
$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} = y$$

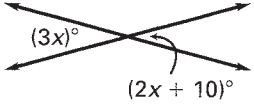
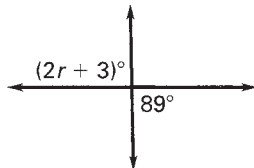
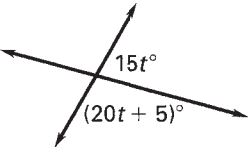
Simplify.

Follow-Up Check your answer for Example 5.Substitute your value for y in the original equation to determine whether it is a solution.

✓ **Checkpoint** Find $m\angle 1$, $m\angle 2$, and $m\angle 3$.

<p>1.</p> 	<p>2.</p> 	<p>3.</p> 
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Find the value of the variable.

<p>4.</p> 	<p>5.</p> 	<p>6.</p> 
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